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Pruning Urban Trees – How much, and how often is it really Necessary?

I have good news for you, the tree owner/manager. Urban trees do not need to pruned nearly as often and as much as most people (including most tree services) believe and/or say they do. Realizing and acting on this fact can save you a lot of time and money, and your trees will probably be much healthier and more structurally stable too. Many people (and tree services) operate on the default principle that every urban tree should be pruned. This is not necessarily true. A more realistic default principle should be that most trees do not need pruning and are usually better off with as little pruning as possible. There are exceptions of course, but in my opinion about 90% of all urban tree pruning is completely unnecessary and quite often detrimental to the tree. It is also a great waste of money for those who are paying for it, not to mention the time, money and space use in disposing of the debris. Most of the urban tree pruning that you see is more of an artificial "manmade" need and does not really benefit the tree, its owner or society as a whole. Urban tree pruning has evolved from the simple removal of a branch here and there when necessary for clearance or some other functional or structural improvement reason to "pruning for the sake of pruning", often with not a rhyme or a reason as to why it is being done at all. Many people must feel that urban trees must be pruned or they will fall apart and/or die.

Figure 1: There is no good reason to prune this hybrid madrone tree other than to pay tree service money to do it. There are no structural defects in the tree. The canopy is dense because this is a young, vigorous tree. This is the way the tree is supposed to look.

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A good example of what is really best for trees is to look at undisturbed trees in their natural environment. Is anyone pruning these trees? Are they falling apart and/or dying because they are not being pruned? All trees do die and fall apart eventually (every living thing does), but the fact that trees can and do survive without pruning is something to learn from. This is not to say that all urban trees should never be pruned – most urban trees in need some pruning due to conflicts with the human civilization. There are other valid reasons to prune trees as well, perhaps the best reason being the early correction of structural defects in young trees at planting time. Unfortunately, this most important and most effective pruning rarely happens although it is easy and inexpensive to do. Instead we seem to concentrate on the pruning of mature trees, when structural defects have often become too large to be able to correct.

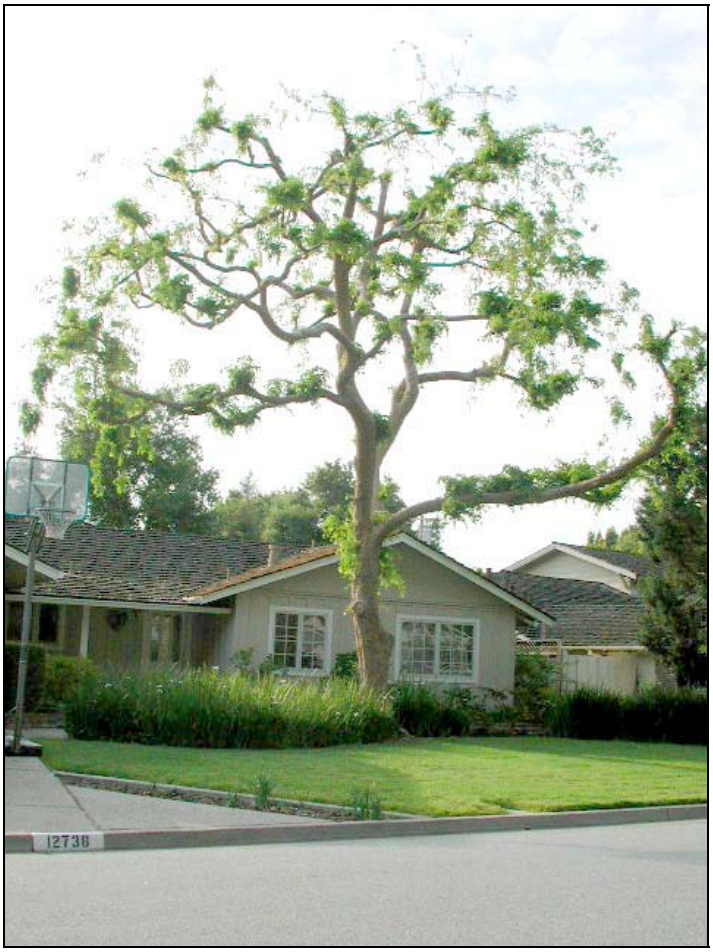

Figure 2: This poor Chinese elm was stripped of just about every single leaf last year. Apparently, leaves are a bad thing to have on trees, and so are most of the branches as well. Maybe the tree service thinks they can fertilize the tree to feed it. Obviously they don't understand that it is the leaves that make food for the tree.

Notice how the tree is trying to "fill in" with small sprouts along the stripped branches. This is an emergency attempt to replace some of the lost food-manufacturing capacity of the tree. The tree has to use stored energy in order to produce this foliage, and that energy will not be available for other tree functions such as defense against pests and diseases. Stripping a tree of branches and foliage like this weakens the tree as well as ruining its structure. The bunchy regrowth will be crowded and not attached deeply within the parent trunk or branch, as are branches of normal growth. This tree was pruned by an "Expert" tree service.

I think that urban trees must be the most misunderstood and physically mutilated living things on the face of this earth. Why do humans butcher trees the way they do? Why do humans feel that they must severely prune and cut back and reduce the size of subdue and exercise absolute dominance and control over trees? Why do humans waste so much money and effort on unnecessary pruning?

This is a difficult question to answer and the roots of the problem probably stem from deep within our psyche – perhaps even originating from our primordial past before we developed the ability to speak. Back then; the wilderness was a dangerous place and something to conquer. Part of they way that we conquered the wilderness was to cut down trees. Then our enemies couldn't hide as well behind or within the trees, and thus we would be safer. Cutting down trees and otherwise subduing the environment made us "better" than those other animals that didn't do that, and perhaps, even smarter. At least it made us the dominant animals, if nothing else. We had the brains and the ability to change our environment more than did any other animal species. And that mindset continues to this day, manifested in pruning without reason. Perhaps this is how humans (now subdued by society itself) act out their primordial instinct to conquer and dominate nature. Another factor that complicates this problem is that people see tree pruning being done – often poor pruning, and they think what they see is the correct way to prune trees, especially if they see a lot of it being done. They then want the same type of pruning performed on their own unfortunate trees.

Figure 3: This flowering pear tree has been overpruned; it has been "lion-tailed".

Perhaps another reason we overprune trees is because trees have the potential to become larger than us, and humans tend to fear things that are larger than we are. We want to make these large things smaller so that we can dominate and control them and so that there is no possibility that they could ever hurt us or cause us problems. More than a decade ago a "tree advocate" named Cass Turnbull started an organization called Plant Amnesty to discourage the bizarre manner in which

humans try to subdue trees and other plants by overpruning – for example pruning trees so they look like hat boxes, removing all branches from trees because "the trees drop too many leaves", *topping*[1] trees, etc. The organization still exists today and can be accessed on the Web at http://www.plantamnesty.org/.

Soapbox aside; let's discuss the most common types of overpruning and/or poor tree pruning. First of all there is a type of pruning that goes by different terms – "lightening", "thinning-out", "opening-up", etc. The correct arboricultural term for this is *over-thinning*[2], and in some instances, *lion-tailing*[3]. What does this mean? It means that too many live branches, particularly lower branches, were removed from the tree, for whatever reason. *Proper pruning*[4] does not remove more than 25% of

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[1] Topping is the practice of indiscriminately cutting back large diameter branches of a mature tree to some predetermined lower height; to reduce the overall height of the tree. Each individual cut is called a *heading cut*, and when most or the entire tree canopy is pruned in this manner this is called *topping* the tree. Heading cuts are cuts made to buds, stubs or lateral branches not large enough to assume the terminal role (at least 1/3 the diameter of the branch portion being cut off). Reputable arborists no longer recommend topping because it is a particularly destructive pruning practice. Topping is stressful to mature trees and may result in reduced vigor, decline and even death. In addition, branches that regrow from topping cuts are weakly attached to the tree and are in danger of splitting out. Large topping cuts may have significant decay associated with them, which weakens the branch as well as the attachment of any secondary branches attached nearby. Topping is useful however, for immediately reducing the risk of a very hazardous tree that will soon be removed.

[2] Thinning pruning is the selective removal of unwanted branches to improve air penetration through the canopy of a tree), or to lighten the weight of branches. This is often done to decrease the wind resistance (wind sail) of a large tree, although the effectiveness of this is questionable. Proper thinning pruning is performed evenly throughout the tree canopy, so that remaining branches and foliage remain evenly distributed throughout the tree. Unfortunately, proper thinning is rarely done and most "thinning" is really lion-tail pruning.

[3] Lion-tail pruning**:** poor but common pruning practice in which an excessive number of branches is thinned from the inside (lower, interior) portion of branches into a clump of terminal foliage. The lower portion of the branch is basically stripped of branches (and thus foliage), leaving the majority of weight concentrated at the end of the branch. A branch pruned as such is subject to sunscald and resultant canker diseases, is "end-heavy" and is generally more likely to fail. Lion-tailing also encourages the growth of crowded, bunchy *watersprout* growth. These small diameter shoots that emerge along stripped branches are not well anchored in the parent branch and are likely to fail as they increase in diameter. Lion- tail pruning is also not desirable in terms of encouraging proper branch taper and correctly managing end weight. The large number of pruning cuts on lion-tailed branches also creates many wounds that will have some decay or cracks associated with them. These many (even if small) wounds can weaken the branch, making it more likely to break. Lion-tailed branches also tend to whip around more in wind, and lion-tailed trees tend to have more branch failures than trees that are not pruned or trees that are pruned correctly. Correct pruning maintains the center of gravity throughout the entire trees as well as on individual branches as low (close to the ground or trunk) as possible.

[4] Arboricultural Industry Pruning Standards:

1. Best Management Practices – Tree Pruning. Companion document to the ANSI 300 Part 1 (below). 2002. International Society of Arboriculture, PO Box 3129, Champaign, IL 61826-3129. 217-355-9411.
2. ANSI Z133.1-2000 Pruning, Trimming, Repairing, Maintaining, and Removing Trees, and Cutting Brush -- Safety Requirements.
3. ANSI (A-300-Part 3) - 2006 Tree Shrub and Other Woody Plant Maintenance – Standard Practices.

the canopy at one pruning and in one growing season, and it is best to remove less than this if possible. Over-thinning sometimes removes 75% of the canopy or more. It makes me wonder why they just didn't take the whole tree out in the first place. Why is this done? Perhaps there was too much shade on the lawn below, or that people want to "see through" the tree, or that someone just thought the tree was "too full" and might break apart because of this. Some of these reasons are valid reasons for an appropriate amount of thinning pruning, but never should a tree be over-thinned. It is also important to understand that pruning trees to "thin them out" and "open them up" does not necessarily make them any safer – in fact it could have just the opposite effect.

Unfortunately this type of over-pruning is common and often accepted (thus desired by the lay public). Trees develop their own form over time based upon their genetic potential combined with the surrounding environment. It is usually when there is a change, for example the removal of surrounding sheltering trees, trenching near the trunk, etc., that we should be worried about failure and may employ some intelligent pruning to reduce risk. Unfortunately, over-pruning can also be a change in that it can disrupt the natural weight balance, adapted to over time. It can also negatively affect the natural sway and resonance of individual branches and the entire tree. This stress (such as when wind blows against a tree) is distributed throughout the entire tree and is usually effectively dampened from the top of the tree to the bottom (the root system) so that minimal failure results. Pruning changes these dynamics, in ways we cannot entirely understand or predict. Overpruning such as lion-tailing can also negatively affects future branch taper, which is important in branch strength. Pruning creates wounds. Decay associated with many wounds close together (as in lion-tailing) can coalesce to create a continuous column of decay in side the mother branch. Even if decay does not coalesce, every pruning cut is a wound that will have some tissue death associated with it – a weak area making failures at that point more likely. All the more reason to minimize the number and size of pruning cuts. Although an overpruned branch may not weigh as much as it did before, if it has decay the branch will be weaker. **Bottom line: don't overprune. Don't prune trees unless there is a really good reason to prune them. Trees don't necessarily have to be pruned. There should be a good reason for each branch removal.**

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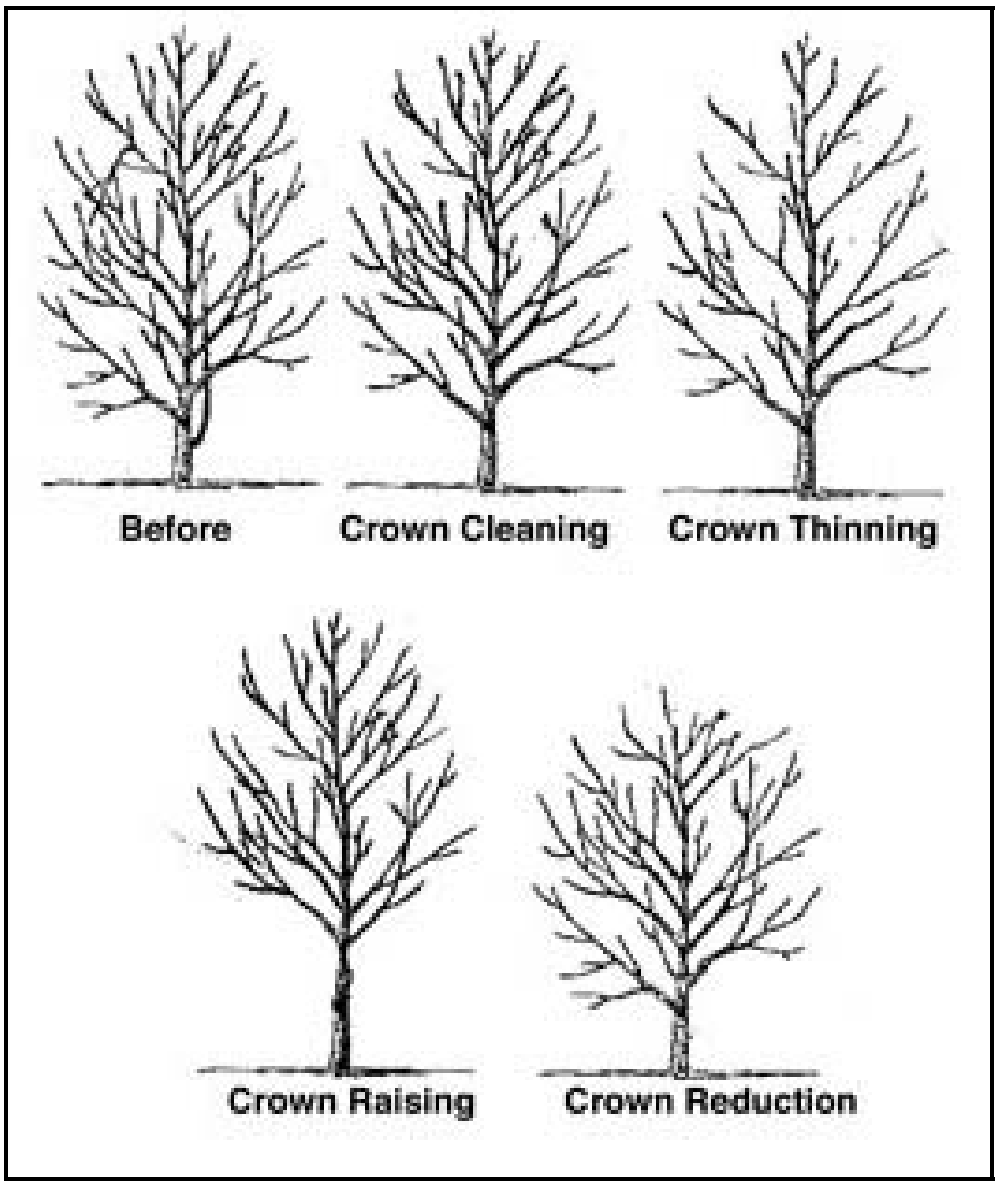
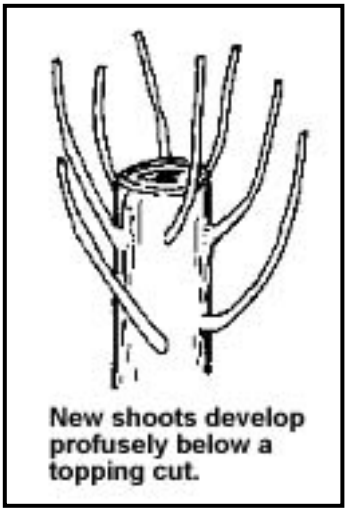
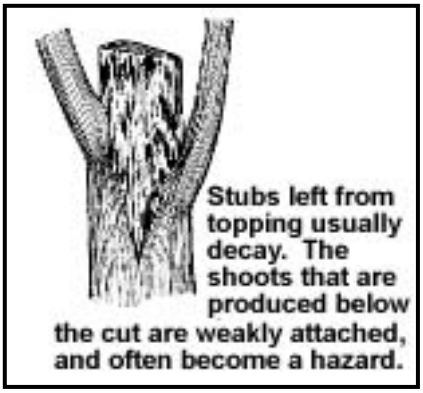


Figure 5: Correct Pruning. Taken from the Consumer Information Brochure, "Pruning Mature Trees". International Society of Arboriculture (ISA), July 1995. Available on the web at: http://www.treesaregood.com/treecare/pruning_mature.aspx





Figures 6, 7 and 8 (left to right). Illustrations of tree topping. Taken from the ISA Consumer Information Brochure, "Why Topping Hurts Trees", 2005. Available on the web at: http://www.treesaregood.com/treecare/topping.aspx

Another common pruning practice is ***end-weight reduction***. This is a type of pruning designed to reduce the weight on long, seemingly heavy branches. There is no scientific evidence that this will prevent branch breakages however, and I am skeptical of its effectiveness, at least in many of the situations I have encountered. Unfortunately, most end-weight reduction pruning that I have seen actually turns out to be lion-tailing, which was discussed before. In fact, I think that most pruning that is done, for whatever reason, ends up being lion-tailing.

End-weight reduction pruning: Used to reduce weight on long, end-heavy branches, especially branches that tend to have a more horizontal orientation and/or extend beyond the general dripline of the tree. These are often but not always the lower, largest diameter branches in the tree. To perform this pruning correctly, thin foliage and small diameter branches and twigs predominantly at the terminal end of the branch, (the outer 1/3 of the branch), removing less as you move down the branch toward the trunk. Try to conserve foliage and branches along the lower portion of the branch. Try not to remove branches greater than 3 inches in diameter. This may mean that only very small amounts (and very small diameter) branches and twigs are removed from the terminal portion of a branch. In addition to reducing end-weight, this also slows the growth of the branch. Subordination pruning which shortens a branch or competing leader to a lower, lateral branch can also be used to reduce branch weight, change branch orientation, or alter growth rate to improve the size of a pruned branch relative to the trunk or parent branch. As with pruning in general, remove no more than 25% of the live foliage on any branch. Maintain live secondary branches along as much of the lower part of the heavy limb as possible (close to the trunk). In other words, try to maintain a low center of gravity as far as the limb is concerned. Do not strip or "lion-tail" branches so that the foliage only remains near the terminal end.

So after reading this paper, now what should you do with your trees? Observe them. Determine if they need any pruning at all before they are pruned. Generally if any pruning at all is needed, it will focus on the `**3 D's**' (dead, diseased, dying) and also crossing/rubbing and hazardous branches. Do any additional necessary pruning after that. Once again, **there should be a good reason for the removal of every branch, and as few branches as possible should be removed from a tree**. Often, it is difficult to tell that a properly pruned tree has been pruned at all, which is another reason that poor pruning and overpruning abound.

The best and most effective pruning that can be done on trees is corrective structural pruning when trees are young, especially soon after planting. This is also the easiest and most inexpensive pruning that can be done, and can often be done by the tree owner themselves rather than hiring a tree service. If structural defects such as *co-dominant*[5] stems are corrected when trees are young and vigorous, the pruning cuts and associated wounds are very small and tend to seal over (by themselves) well and with little or no decay. Trying to correct these defects when they are large however, may do more harm than good – the wounds and associated decay caused by a large pruning wound on a mature or older, less vigorous tree may be cause the tree to be more hazardous than leaving the defect in place and/or performing none or less effective pruning.

[5] Co-dominant refers to two leaders, branches or trunks that arise at the same point on a tree and are about the same diameter. This is an undesirable structural defect that is a weak point in the tree. Co-dominant stems typically lack the overlapping tissue present in a branch or trunk collar, which may be why trees with this defect split so easily. It is best that branches or trunks originate with space between them, or if they arise at the same point that they be of different sizes. Co-dominant leaders can often be corrected (one leader removed) when trees are young. When trees are older it is often better to subdue the smaller or more undesirable member by thinning the terminal half of the foliage by 25% to slow its growth and ultimate size relative to the other member.

More information on the correct pruning of young trees can be found in the ISA Consumer Information Brochure, "Pruning Young Trees" at:
http://www.treesaregood.com/treecare/pruning_young.aspx

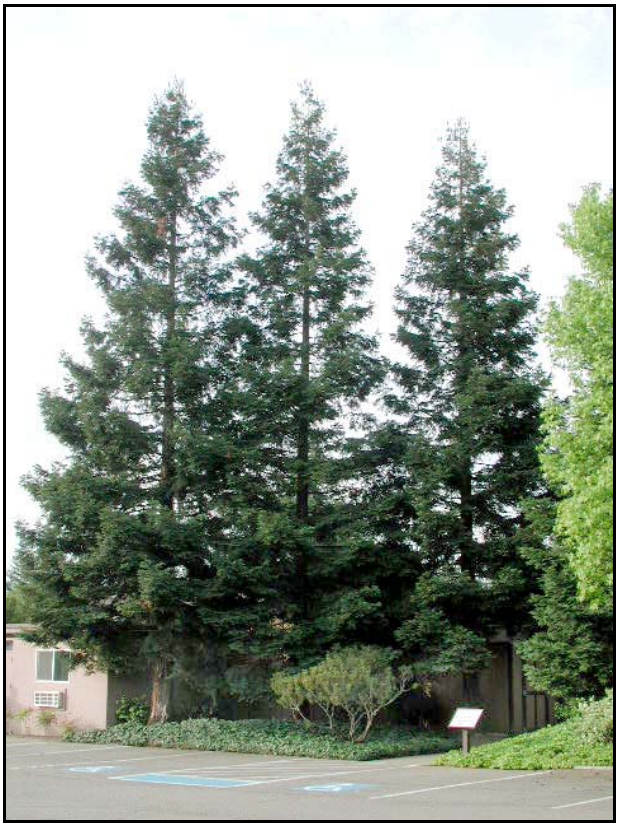


Figure 9 (left): These coast redwood trees do not need to be pruned. Perhaps some day if lower branches interfere with the parking lot, it would be reasonable to remove such branches. We should try to conserve as many healthy, live lower branches on trees (and on individual branches) as possible. A low center of gravity is much more stable than a high center of gravity. Unfortunately, most tree services prune trees to favor a high center of

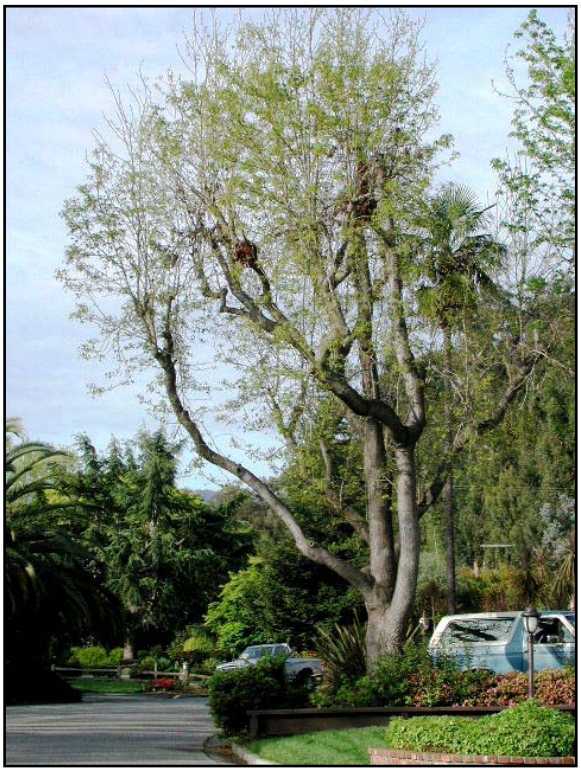


Figure 10 (right): This American sweet gum tree was topped and lion-tail pruned. In the long term, this didn't do much good in keeping the tree shorter, did it? In fact, topped trees often grow back taller than they were before they were topped, and with much worse structure. Crowded, weakly attached sprouts (*epicormic shoots*) have grown from just beneath the topping cuts. Some of these shoots are more than 10 feet long.

Why do so many tree services perform poor tree pruning? I think that there are five primary reasons:

1. **They don't know how to prune trees properly**

2. **They don't care about pruning trees properly**

3. **They want to remove as much from the tree as possible so that they can get as much money for pruning the tree as possible.** *More branches on the ground = the more work I did = the more I get paid (?)*

4. **Their client insists on this type of pruning, because they have seen it so much before, and they think this is the right way to prune trees.** *Besides, the clients want their trees to look like everyone else's trees. Kind of like the current fashion trend, except this one has been going on for much too long a time! A very unfortunate consequence of this dilemma is that if the tree service refuses to do the improper pruning, they will probably not get the job. Instead, another tree service company that does improper pruning on a regular basis and as a regular part of their business will get the job. This unfortunate consequence only helps to propagate the improper pruning that occurs and serves as an advertisement for the practice to continue.*

5. **Tree services that do improper pruning as a part of their business are often much cheaper than tree services that do proper pruning – perhaps in the short term – but not in the long term!** *Some reasons for this is that the "bad" tree services often do not have or continue education and training in their field (although they will tell you they are "tree experts"), they often are not licensed, insured or carry proper workman's compensation, they may not use quality equipment or keep it in good repair, and a myriad of other reasons that separate good businesses from bad businesses.*

I don't have any valid statistics to back me up, but I have a feeling that the great majority of tree services (at least in my area, the supposedly highly-educated Silicon Valley of California) are run by managers (and tree workers) who don't know how to prune trees properly. In addition, even some of the "better" tree services over-prune trees, probably due to at least some part to items #3 and 4 above.

If you hire a tree service, they should be licensed and insured. Many of them (especially the really cheap ones) are not. It is also a good idea to make sure that at least the person specifying and supervising the pruning is at minimum an ISA Certified Arborist, and preferably the work should be done by ISA Certified Tree Workers. They should have and follow the most current Arboricultural Industry Standards when practicing tree work *(see Footnote #4, page 4).*

A **Certified Arborist**: an *arborist* (a person who provides advice about urban trees) certified (through taking an initial multiple-choice exam, at least 3 years of work experience in the tree industry, the payment of an annual fee and 36 hours of continuing education requirements every 3 years) by the *ISA* (International Society of Arboriculture). Although arborist certification has greatly raised standards in the tree care industry, it must be cautioned that certification is not equivalent to a college degree in urban forestry, horticulture or one of the other plant science fields. Although some certified arborists do have college degrees in their field, most do not. A ***Board Certified Master Arborist*** must meet higher eligibility requirements, pass a more comprehensive test, and has a larger and more specific continuing education requirement. No degree required for this designation either. A **Registered Consulting Arborist** of the American Society of Consulting Arborists (ASCA) has the most stringent standards of all and is the "cream of the crop" of consulting arborists. Even for this latter designation (and to my everlasting dismay) no degree is required. One more thing: Arborists are supposed to be able to provide advice about urban trees and their care. Tree Workers working for Tree Services perform the physical tree work, such as pruning. Some Arborists are Tree Workers and vice versa, but this varies quite a bit.

References:

- An Illustrated Guide to Pruning. 2nd Ed. Gilman. Delmar Publishing. 2002.
- ANSI A300 Pruning Standards. 2001 Edition. Ibid. (Covers tree care methodology).
- ANSI Z133.1 American National Standards for Tree Care Operations. 2006 Edition. Secretariat: National Arborist Association, Inc. American National Standards Institute, 11 West 42nd St., New York, New York, 10036. (Covers safety)
- Arboriculture – Integrated Management of Landscape Trees, Shrubs & Vines, 4th Ed. Harris et al. Prentice Hall. 2004.
- Best Management Practices, Tree Pruning. 2002. International Society of Arboriculture, PO Box 3129, Champaign, IL 61826-3129. 217-355-9411
- International Society of Arboriculture (ISA) (general web site): http://www.isa-arbor.com/home.aspx
- International Society of Arboriculture (ISA), Trees Are Good, Consumer Information Brochure section of ISA's web site at http://www.treesaregood.com/treecare/treecareinfo.aspx. This is a good, free, accessible source of science-based tree care in an easy-to-read format for the average tree owner.

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I hope that this information has been helpful to you. May your trees be better pruned (or less pruned or not pruned at all), may they be healthier and more structurally stable, and may there be more money in your bank account.

Sincerely,

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